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Cultivation of Horticultural Plants Based on Hydroponic NFT System using a Portable Greenhouse in Sidomulyo Village, Langkat

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ABSTRACT
Various land use change phenomena have occurred from time to time, especially in Sidomulyo Village, Stabat District. Changes in land use are occurring in line with the increasing population, which has a direct impact on the increasing need for land, especially agricultural land. Sidomulyo Village is located in the urban area of Stabat City, so according to government regulations regarding land use, Sidomulyo Village must be dominated by community settlements, not agricultural land. For this reason, the USU Community Service team offered a solution to continue to be able to carry out agricultural cultivation on limited land, namely the use of the NFT hydroponic system using an easy-to-use portable greenhouse. This cultivation only requires a small amount of land to cultivate horticultural vegetables. The aim of this activity is to develop an NFT system for hydroponic-based horticultural cultivation in Sidomulyo Village so that the community in Sidomulyo Village, Stabat District, becomes an economically and socially independent community and can become a role model for other farmer groups. The next planned stage that must be carried out is monitoring and evaluating the development of horticultural vegetable cultivation through to harvesting and post-harvest handling.

Keyword: Greenhouse Portable, Hidroponic NFT, Horticulture

1. Introduction

Agricultural problems are a problem that continues to exist in Indonesia in relation to economic development. Remembering that Indonesia is an agricultural country that actually relies on the agricultural sector. Indonesia has quite extensive agricultural land. Around 191.09 million ha is Indonesia's land area, and 95.90 million ha (50.19%) has the potential to be used for agriculture. Land available for agriculture is 34.58 million ha [1].

With such extensive agricultural land, Indonesia is actually able to carry out economic development through the agricultural sector. Agricultural land is now increasingly limited, especially agricultural land in urban areas. This is due to the change in the function of agricultural land to industrial land. This land conversion is not without reason. Modernization has transformed all aspects of human life. Modernization is always followed by industrialization, urbanization, differentiation, secularization, centralization, and so on [2]. Traditional values must shift to completely modern values.

The increasingly narrow agricultural land is certainly marked by a reduction in agricultural production activities, In the beginning, there were farming activities which then changed to other activities outside of farming. As a result of the conversion of agricultural land, it is not uncommon for farmers to change professions because they are considered unprofitable or often suffer losses. The majority of farmers who change professions work in industry and factories. Or someone is urbanizing into the city. The causes of agricultural

land becoming narrow include the construction of housing on agricultural land. The increase in population is directly proportional to the need for housing. So, the property or housing business is increasingly booming. Farmers who are lured by high prices are finally tempted to sell their rice fields to developers.

Changing the function of agricultural land to industrial land is not always the answer to economic problems in Indonesia. The Central Statistics Agency notes that the area of raw rice fields continues to decline by around ± 110,000 ha/year [3]. The conversion of agricultural land actually gives rise to new problems, like a domino effect that changes all other aspects. Apart from having an impact on the environment, the conversion of agricultural land raises the problem of Indonesia's food security. This is because Indonesia has too intense contact with foreign countries.

Sidomulyo Village is located in Stabat District, Langkat Regency, very close to urban areas. So agricultural land is required to be converted into residential areas. According to the Central Statistics Agency [4] in 2023, there will be no more rice fields found in Sidomulyo Village. In fact, in Sidomulyo Village the highest profession is the farming profession. This shows that there is a high rate of conversion of agricultural land to non-agricultural land in Sidomulyo Village. This made the service team want to carry out outreach and outreach activities by cultivating horticultural plants based on the NFT hydroponic system using a portable greenhouse in Sidomulyo Village, Stabat District, Langkat Regency.

Hydroponics is a way of cultivating plants without using soil. For the planting medium. A substitute for soil media in hydroponics is to use water media or materials that do not contain nutrients, such as husks, rock wool, gravel, and coconut fiber. There are 2 types of hydroponic systems, namely: passive and active systems. One of the hydroponic methods that is widely used today is the Nutrient Film Technique (NFT). The NFT method is a method of providing nutrition by flowing water containing nutrients and circulating continuously so that the roots do not rot easily. The advantage of this NFT system is that plants get water and nutrients, which will then be absorbed by the plant roots. Light is an electromagnetic wave that under certain conditions can behave like a particle. Electromagnetic waves are waves that do not require a medium to propagate, so light can propagate without requiring a medium [5]. This activity aims to develop an NFT system for hydroponic-based horticultural cultivation in Sidomulyo Village so that the community in Sidomulyo Village, Stabat District, becomes an economically and socially independent society and can become a role model for other farmer groups.

2. Materia and Methods

This activity was carried out at the house of the chairman of the Sejati Farmers Group which is located in Sidomulyo Village, Stabat District, Langkat Regency. The steps taken to address the problems that occurred in the Sejati Farmers Group were to carry out initial socialization of the solution plan offered by the service team to partners, in this case, the Chairman of the Sejati Farmers Group (Mr. Wagirin) and coordinate with the Coordinator of the Agricultural Extension Center (Mr. Subagus Katib, S.ST) which will be proven by a letter of cooperation between partners and the USU service team. After the partners understand and agree to the collaboration, the team will hold discussions regarding the timing of counseling/training and outreach regarding the application of greenhouses to hydroponic-based horticultural plants. by using the NFT system. This activity is also a top priority in several aspects such as economic aspects and socio-cultural aspects in society.

The materials and tools used in this service activity are a portable greenhouse, an NFT hydropic system using pipes, net pods, Rockwool, flannel wicks, AB Mix fertilizer, vegetable seeds such as Nauli F1 pakchoy, SHINTA sweet mustard greens, and BANGKOK kale. Apart from that, the service team must prepare tools that support the process of this activity. The tools used in this service are pH meters, ppm meters, cameras, Rockwool saws, pot trays for planting vegetable seeds,

The approach method that will be used in implementing the 2024 Economic and Social Scheme Service Activity program is through a survey of potential/problems in the Farmer Group that is used as a partner, namely the Real Farmer Group located in Sidomulyo Village, Stabat District, Langkat Regency. The activity continued with a Focus Group Discussion (FGD). Guidance training in the form of counseling on the technical aspects of assembling a Portable Greenhouse, NFT system hydroponic-based horticultural cultivation methods, actions/activities, and mentoring and conducting program outreach through counseling and discussions with direct farmer members.

The work procedures for the 2024 Economic and Social Scheme community service activities are as follows:

a. Socialization Stage
After the materials and tools have been collected, the counseling and outreach stage is carried out to the fishermen farmers in the Sejati Farmers Group, starting with:
1. Opening and welcoming remarks
Opening and welcoming remarks by the head of the service team, namely Nur Ulina Warnisyah Sebayar, SP., M.Agr, opening remarks by the Coordinator of the Stabat District Agricultural Extension Center (Subagus Katib, S.ST), opening remarks by the Sidomulyo Village Field Agriculture Extension Officer (Hidayati Mardhiyah SP.) as well as welcoming remarks from the Chairman of the True Farmers Group (Mr. Wagirin).
2. Short Training in Hydroponics and Horticulture
At this stage, all service activity participants will be given training material regarding hydroponics which includes the understanding of hydroponics, the goals and benefits of hydroponics, the types of hydroponic systems, and the advantages and disadvantages of each hydroponic system. This activity was guided by members of the service team, namely Mr. Antonio Marro Sipayung, SP., M.Agr.
3. Practice of Assembling NFT Hydroponic Systems
This activity was carried out together with all participants from the True Farmers Group who were present and guided by students namely Nico Evfraim Damanik, Laurensius S., Rico Tri Walanda, Abednego Sinaga, and Okal Jundi Al Zidhane (Figure 2.). In this activity, farmers are trained to be able to make a hydroponic nutrient solution from AB Mix Fertilizer, then the ppm in the nutrient solution must be measured using a TDS meter. This activity also trains participants to be able to make seedbeds for vegetable seeds using trail pods and rock wool. Then participants were also trained to be able to install the net pod by installing flannel cloth as a wick into the net pod.

b. Monitoring and Evaluation Stage
Monitoring can be done through discussions by telephone or by WhatsApp, this is done so that the service team continues to monitor the growth of hydroponic vegetables. Monitoring will also be carried out by coming directly to the field when vegetables are harvested until post-harvest handling.

3. Result and Discussion

In carrying out the activity, the stages carried out by the community service team were opening and welcoming remarks by the head of the service team, namely Nur Ulina Warnisyah Sebayar, SP., M.Agr, opening remarks by the Coordinator of the Stabat District Agricultural Extension Center (Subagus Katib, S.ST) , welcoming remarks by the Sidomulyo Village Field Agriculture Extension Officer (Hidayati Mardhiyah SP.) as well as welcoming remarks from the Chairman of the Sejati Farmers Group (Mr. Wagirin). Furthermore, all service activity participants will be given training materials regarding hydroponics which include the meaning of hydroponics, the goals and benefits of hydroponics, the types of hydroponic systems, and the advantages and disadvantages of each hydroponic system. This activity was guided by members of the service team, namely Mr. Antonio Marro Sipayung, SP., M.Agr.

Next, practice assembling the hydroponic NFT system was carried out. This activity was carried out together with all participants from the True Farmers Group who were present and guided by students namely Nico Evfraim Damanik, Laurensius S., Rico Tri Walanda, Abednego Sinaga, and Okal Jundi Al Zidhane (Figure 2.). In this activity, farmers are trained to be able to make a hydroponic nutrient solution from AB Mix Fertilizer, then the ppm in the nutrient solution must be measured using a TDS meter. This activity also trains participants to be able to make seedbeds for vegetable seeds using trail pods and rock wool. Then participants were also trained to be able to install the net pod by installing flannel cloth as a wick into the net pod.

The stages in making a hydroponic NFT system are as follows (Figure 1):
1. Connect the ½” pipe to the pipe connection provided to unite the hydroponic legs of the NFT system
2. Connect the large pipe with a DV Knee (pipe connection according to the number on the pipe)
3. Install the water pump in the hydroponic installation by connecting it to an electric current and inserting the pipe hose into the bucket containing the AB mix nutrient water.
4. The NFT hydroponic installation is ready to use

Figure 1. The process of installing the NFT hydroponic system installation

Next, monitoring activities are carried out. Monitoring can be done through discussions by telephone or by WhatsApp. this is done so that the service team continues to monitor the growth of hydroponic vegetables. Monitoring will also be carried out by coming directly to the field when vegetables are harvested until post-harvest handling and the final activity was the handover of tools and materials to the Sejati Farmers Group (Figure 2).

Figure 2. handover of tools and materials for the 2024 economic and social scheme service to real farmer groups in Sidomulyo sub-district

The inhibiting factor in implementing this community service is that farmers are required to have electricity that remains active 24 hours so that the NFT hydroponic system which uses an electric pump can continue to run so that horticultural plants can remain well nourished. If there is a power outage for too long, the plants will wilt.

The supporting factor in implementing the service that really helped the realization of this activity was the positive response from farmers and the community at the partner locations, starting from surveying the service location, making proposals, sending materials and equipment during the service, to socialization activities, and providing technical guidance. taking place. A positive response was shown by a good and warm welcome when the USU LPPM service team arrived at the location and when the activities were carried out. In this activity, it was seen that all farmers in the Tani Sejati group had a high sense of enthusiasm in participating in this activity to open their horizons and increase farmers' knowledge.

4. Conclusion

Based on all the Community Service activities that have been carried out, it can be concluded that hydroponic-based horticultural plant cultivation using the NFT system has advantages and disadvantages. The advantage of the NFT system is that farmers do not need to stir the nutrient water all the time because they already use a water pump, but the disadvantage of this system is that when there is a power outage, the water pump will stop. If the power outage lasts long enough, it can cause the cultivated vegetables to wilt. Apart from that, this activity also provides many benefits for farmers. Apart from that, currently, the farmers are very happy and grateful to LPPM USU because they have been given the opportunity to be given a new source of income by utilizing portable greenhouses on limited land. In this activity, it was seen that all farmers in the Tani Sejati group had a high sense of enthusiasm in participating in this activity to open their horizons and increase farmers' knowledge. The Stabat Agricultural Extension Center Coordinator also supported this activity.

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